Manual Overview

Please include the Manual Number and the Manual Version shown below when communicating with us regarding this publication.

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1. Communication Cable

1.1 Connectors - Pinout

Pin Assignment (RJ-45) for CAN bus Wiring



Pin No.	Signal Name	Description
1	CAN_H	CAN_H bus line
2	CAN_L	CAN_L bus line
3	CAN_GND	Ground
4	- - -	Reserved
5	- - -	Reserved
6	- - -	Reserved
7	- - -	Reserved
8	- - -	Reserved

1.2 Baudrate Settings

Baudrate and Bus Length

Baudrate	Bus Length
1Mbps	25m
750Kbps	50m
500Kbps(Default)	100m
250Kbps	250m
125Kbps	500m

2. System Setup

2.1 Scope of Function

2.1.1 Function supported by Delta

- CANopen protocol: NMT, SYNC, SDO, PDO, EMCY
- SDO transfer for reading and writing parameters and communication settings.
- PDO sends/receives along with time-trigger, event-trigger, sync cyclic and sync acyclic.
- Node Guarding
- Heartbeat

2.1.2 Function not supported by Delta

- Time Stamp

2.2 Parameter Settings of CANopen Mode

2.2.1 Connect CANopen Host Controller

Users can follow the below instructions to connect CANopen Host Controller and servo drive A2.

① Set parameter **P1-01** to **0x0B**$_h$ or **0x0C**$_h$ for CANopen mode.
0x0B$_h$ is used for simple CANopen mode and it does not support complete CANopen protocol；0x0C$_h$ is used for standard CANopen protocol and it is recommended to be connected to any motion controller.

② Set Parameter P3-00 to Node Id for range 01h~7Fh.

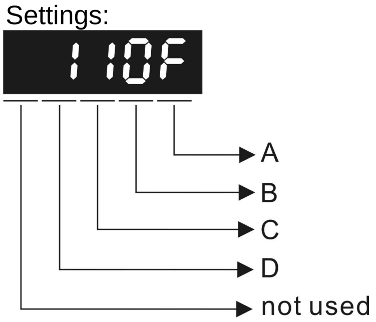
③ Set Parameter P3-01 to 0403h for Baudrate 1Mbps (0: 125Kbps; 1: 250Kbps; 2: 500 Kbps; 3: 750Kbps; 4:1Mbps).

④ Set Parameter P3-09 to 0x5055h for Synchronization.

2.2.2 Parameters for CANopen Setup

P1 - 01●	CTL	Control Mode and Output Direction		Address: 0102H, 0103H
	Operation Interface:	Keypad / Software	Communication	Related Section: 6.1, Table 8.A
	Default:	0		
	Control Mode:	ALL		
	Unit:	pulse (P mode), r/min (S mode), N-m (T mode)		
	Range:	00 ~ 110F		
	Data Size:	16-bit		
	Display Format:	Hexadecimal		

Settings:



A: Control mode settings

	Pt	Pr	S	T	Sz	Tz
Single Mode						
00	▲					
01		▲				
02			▲			
03				▲		
04					▲	
05						▲
Multiple Mode						
0E	▲	▲	▲			
0F	▲	▲		▲		

	Pt	Pr	S	T	Sz	Tz
Dual Mode						
06	▲		▲			
07	▲			▲		
08		▲	▲			
09		▲		▲		
0A			▲	▲		
0B	CANopen Mode (Half)					
0C	CANopen Mode (Full)					
0D	▲	▲				

Pt: Position control mode. The command is from external pulse or analog voltage (external analog voltage will be available soon). Execution of the command selection is via DI signal, PTAS.

Pr: Position control mode. The command is from internal signal. Execution of 64 positions is via DI signals (POS0 ~ POS5). A variety of homing control is also provided.

S: Speed control mode. The command is from external signal or internal signal. Execution of the command selection is via DI signals, SPD0 and SPD1.

T: Torque control mode. The command is from external signal or internal signal. Execution of the command selection is via DI signals, TCM0 and TCM1.

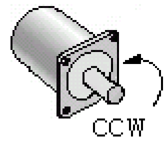
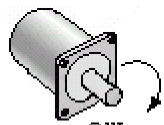
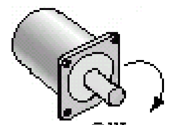
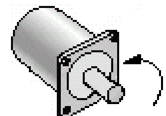
Sz: Zero speed / internal speed command

Tz: Zero torque / internal torque command

Dual Mode: Control of the mode selection is via DI signals. For example, either Pt or S control mode can be selected via DI signal, S-P (see Table 8.A).

Multiple Mode: Control of the mode selection is via DI signals. For example, either Pt or Pr or S control mode can be selected via DI signals, S-P and Pt-Pr (see Table 8.A).

B: Torque output direction settings

Direction	0	1
Forward		
Reverse		

C: Discrete I/O Setting

1: When switching to different mode, digital inputs/outputs (P2-10 ~ P2-22) can be reset to be the default value of the mode you switch to.

0: When switching to different mode, the setting value of digital inputs/outputs (P2-10 ~ P2-22) will remain the same and will not be changed.

P3 - 00	ADR	Communication Address Setting		Address: 0300H, 0301H
	Operation Interface:	Keypad / Software	Communication	Related Section: 9.2
	Default:	0x7F		
	Control Mode:	ALL		
	Unit:	N/A		
	Range:	0x01 ~ 0x7F		
	Data Size:	16-bit		
	Display Format:	Hexadecimal		

Settings:

This parameter is used to set the communication slave address in hexadecimal format.

This address is an absolute address which represents the servo drive on a RS-232/485 or

CANbus network.

Display	0	0	Y	X
Range	-	-	0 ~ 7	0 ~ F

X: Axis number, the value must be within the range from 0 through F.

Y: Group number, the value must be within the range from 0 to through 7

If the AC servo drive is controlled by RS-232/485 communication, each drive (or device) must be uniquely identified. One servo drive only can set one address. If the address is duplicated, there will be a communication fault.

Please note:

1. This parameter does not provide broadcast function and does not respond insecurity.
2. When the address of host (external) controller is set to 0xFF, it is with auto-respond function. Then, the servo drive will receive from and respond to host (external) controller both no matter the address is matching or not. However, the parameter P3-00 cannot be set to 0xFF.

P3 - 01	**BRT**	**Transmission Speed**		**Address: 0302H, 0303H**
	Operation Interface:	Keypad / Software	Communication	Related Section: 9.2
	Default:	0x0203		
	Control Mode:	ALL		
	Unit:	bps		
	Range:	0x0000 ~ 0x0405		
	Data Size:	16-bit		
	Display Format:	Hexadecimal		

Settings:

This parameter is used to set the baud rate and data transmission speed of the communications.

Display	0	Z	Y	X
COM Port	-	CAN	-	RS-232/485
Range	0	0 ~ 4	0	0 ~ 5

X: Baud rate setting

0: Baud rate 4800

1: Baud rate 9600

2: Baud rate 19200

3: Baud rate 38400

4: Baud rate 57600

5: Baud rate 115200

Y: Reserved. Must be set to be 0.

Z: Data transmission speed setting.

0: 125K bits / second

1: 250K bits / second

2: 500K bits / second (Default)

3: 750K bits / second

4: 1.0M bits / second

Please note:

1. When setting this parameter via CANopen communication, only the setting of Z (data transmission speed setting) can be configured and other settings.
2. The communication transmission speed for USB can be set to 1.0M bits / second only and cannot be changed.

P3 - 09	SYC	CANopen Synchronization Setting		Address: 0312H, 0313H
	Operation Interface:	Keypad / Software	Communication	Related Section: -
	Default:	0x5055		
	Control Mode:	CANopen		
	Unit:	N/A		
	Range:	refer to the description of Settings		
	Data Size:	16-bit		
	Display Format:	Hexadecimal		

Settings:

This parameter is used to set the CANopen slave to be synchronized with the CANopen master through synchronization signal. Although this parameter allows the users to execute manual adjustment, if not necessary, we do not recommend users to change the default setting manually.

Display	E	T	D	M
Function	SYNC error range	Target value	Dead zone range	Clock correction setting
Range	1 ~ 9	0 ~ 9	0 ~ F	1 ~ F

M: Clock correction setting, the value must be within the range from 1 through F, and the unit is usec.

When setting the CANopen slave to be synchronized with the CANopen master, the clock of the servo drive must be corrected. This function is used to set the maximum correction everytime.

D: Dead zone range, the value must be within the range from 0 through F, and the unit is usec.

When the difference between actual value and target value of SYNC signal reach time does not exceed the dead zone range, the clock correction does not need to be changed.

T: Target value of SYNC signal reach time, the value must be within the range from 0 through 9, and the standard value of SYNC signal reach time is 500 usec.

Target reach time of synchronization signal = 300 + 10 x setting value of T.

For example:

When T is set to 5, the target reach time of synchronization signal = 300 + 10 x 5 = 450

There should be a buffer between the target value and the standard value. The target value should be less than the standard value. If the target value is above than the standard value, an error may occur.

E: SYNC error range, the value must be within the range from 1 through 9, and the unit is 10 usec.

When the difference between actual value and target value of SYNC signal reach time is below this range, it indicates that the CANopen slave synchronize with the CANopen master through synchronization signal.

P3-10	**CANEN**	**CANopen Protocol Setting**		**Address: 0314H 0315H**
	Operation Interface:	Keypad / Software	Communication	Related Section: N/A
	Default:	0x0000		
	Control Mode:	CANopen		
	Unit:	N/A		
	Range:	refer to the description of Settings		
	Data Size:	16-bit		
	Display Format:	Hexadecimal		

Settings:

Display	U	Z	Y	X
Function	N/A	N/A	Motor status when CAN bus error occurs	CANopen DS402 protocol version
Range	N/A	N/A	0 ~ 1	0 ~ 1

X=0 : partially supportive for CANopen DS402 protocol. (for earlier Delta products)

X=1: supportive for complete CANopen DS402 protocol.

Y=0: When CAN bus error occurs, free run.

Y=1: When CAN bus error occurs, servo off.

Z: N/A

U: N/A

Please note:

1. For ASDA-A2-M model, Y-bit is available, but X-bit is invalid.
2. For ASDA-A2-F model, X-bit is always be 1.

P3-11	CANOP	CANopen saving options	Address: 0316H 0317H

Operation Interface:	Keypad / Software	Communication	Related Section: N/A
Default:	0x0000		
Control Mode:	CANopen		
Unit:	N/A		
Range:	refer to the description of Settings		
Data Size:	16-bit		
Display Format:	Hexadecimal		

Settings:

Display	U	Z	Y	X
Function	N/A	N/A	N/A	Options of saving parameters in EEPROM
Range	N/A	N/A	0 ~ F	0 ~ 1

X=0 : don’t save parameters in EEPROM

X=1: save parameters in EEPROM by PDO writing

Y: N/A

Z: N/A

U: N/A

Please note:

1. This parameter is only available for ASDA-A2 -M and -F models.
2. When X=1, continuously PDO writing parameters may shorten EEPROM’s lifespan.

P3-12	QSTPO	CANopen Quick Stop Settings	Address: 0318H 0319H

Operation Interface:	Keypad / Software	Communication	Related Section: N/A
Default:	0x0000		
Control Mode:	CANopen		
Unit:	0x0000 ~ 0x0111		
Range:	refer to the description of Settings		

Data Size:	16-bit
Display Format:	Hexadecimal

Settings:

Display	U	Z	Y	X
Function	N/A	Reload CANopen values	Optional Quick Stop mode (in auto protection)	OD-6040 supportive for Quick Stop
Range	N/A	0~1	0 ~ 1	0 ~ 1

X=0 : Only when OD-6040 Bit3 (Enable Operation) =1, then execute servo on.

X=1 : When all OD-6040 Bit0, Bit1, and Bit3 (meet CANopen DS402 protocols) =1, then execute servo on.

When OD-6040 Bit2 (Quick Stop) =1, then servo drive will go to Quick Stop mode.

Y=0 : When motor slows down to stop by auto protection, servo drive will not go to Quick Stop mode.

Y=1 : When motor slows down to stop by auto protection, servo drive will still go to Quick Stop mode. To continue other actions, it's necessary to give servo drive "Fault Reset" command.

Z=0 : When servo drive is power on or reset, parameters in below table will reload the default settings.

Z=1 : When servo drive is power on or reset, parameters in below table remain the previous settings.

List of CANopen Object and parameters relative to P3-12 Z setting.

CANopen Object		Parameter	
Index	Default	Parameter	Default
$605B_h$	0	P1-32	P1-32.Y = 0, Dynamic break enable($605B_h$=-1) P1-32.Y = 1, Dynamic break disable($605B_h$=0)
6065_h	3840000	P2-35	3840000
$606D_h$	100(0.1rpm)	P1-47	10(rpm)
$606E_h$	0	P1-49	0
$606F_h$	100	P1-38	100
6083_h	200	P1-34	200
6084_h	200	P1-34	200
6087_h	200	P1-34	200
6093_h	1:1	P1-44 / P1-45	128:10

U: N/A

3. CANopen Operation Modes

3.1 Profile Position Mode

3.1.1 Description

Servo drive (hereinafter referred to as "Drive")receives position command from host (external) controller (hereinafter referred to as "Host") and then control servo motor to reach target position.

Pulse of User-defined Unit Definition:

$$\text{Pulse of User Unit (PUU): No. of } \frac{PUU}{Rev} = 1280000 \times \frac{OD\text{-}6093_h \text{ Sub2}}{OD\text{-}6093_h \text{ Sub1}}$$

3.1.2 Operation Procedure

① Set【Mode of operations:6060_h】 to profile position mode(1).

② Set【Target position:607Ah】to target position. (unit: PUU)

③ Set【Profile velocity:6081h】to profile velocity. (unit: PUU per second)

④ Set【Profile acceleration:6083h】to plan acceleration slope. (millisecond from 0rpm to 3000rpm)

⑤ Set【Profile deceleration:6084h】to plan deceleration slope. (millisecond from 0rpm to 3000rpm)

⑥ Set【Controlword:6040h】 to servo on drive and make motor work.

⑦ Query【Statusword:6064h】to get feedback position of motor.

⑧ Query【Statusword:6041h】to get drive status of following error、set-point acknowledge and target reached.

3.1.3 Advanced Procedure

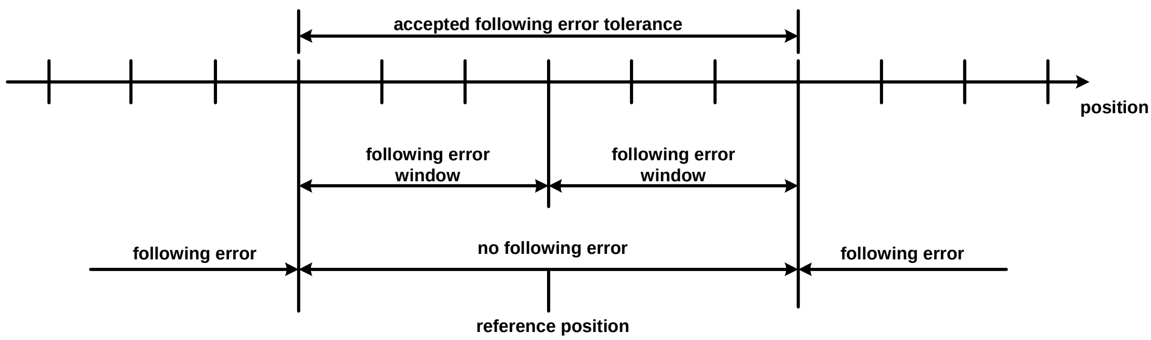
① Host could get more information about profile position mode.

- Query【Position demand value:6062_h】to get internal position command. (unit: PUU)
- Query【Position actual value*:6063_h】to get actual position value. (unit: increments)

② Following error

- Set【Following error window:6065_h】 to define range of tolerated position values symmetrically to the position demand value. (unit: PUU)

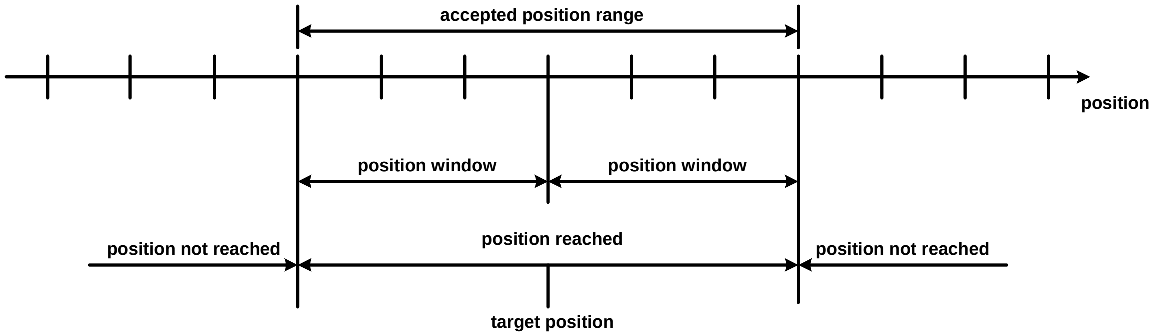
Query【Following error actual value:$60F4_h$】to get actual value of following error. (unit: PUU)



Reference position

③ Position window

- Set【Position window:6067$_h$】to define a symmetrical range of accepted positions relatively to the target position. (unit: PUU)
- Set【Position window time:6068$_h$】to plan time of activation of target reached. (unit: millisecond)



Position reached

3.1.4 Associated Object List

Index	Name	Type	Attr.
6040$_h$	Controlword	UNSIGNED16	RW
6041$_h$	Statusword	UNSIGNED16	RO
6060$_h$	Modes of operation	INTEGER8	RW
6061$_h$	Modes of operation display	INTEGER8	RO
6062$_h$	Position demand value [PUU]	INTEGER32	RO
6063$_h$	Position actual value [increment]	INTEGER32	RO
6064$_h$	Position actual value	INTEGER32	RO
6065$_h$	Following error window	UNSIGNED32	RW
6067$_h$	Position window	UNSIGNED32	RW
6068$_h$	Position window time	UNSIGNED16	RW
607A$_h$	Target position	INTEGER32	RW
6081$_h$	Profile velocity	UNSIGNED32	RW
6083$_h$	Profile acceleration	UNSIGNED32	RW
6084$_h$	Profile deceleration	UNSIGNED32	RW
6093$_h$	Position factor	UNSIGNED32	RW
60F4$_h$	Following error actual value	INTEGER32	RO
60FC$_h$	Position demand value	INTEGER32	RO

(Please refer to the following “Details of Objects” section for more detailed descriptions)

3.2 Interpolation Position Mode

3.2.1 Description

- The Host sends a broadcast SYNC frame (0x80) cyclically.
- With each PDO, the Host sends the next reference position Xi, the difference $\triangle X_i$ and controlword to the drive.
- While the next SYNC receiving, the drive interpolates from X_{i-1} to X_i.
- There is no input data buffer, which will cause delay.

Extrapolation, Jitter Compensation

- When SYNC object is delayed, the interpolator should generate with the last acceleration and extrapolate predicted speed and position.
- When the SYNC delays for 2*cycle, Drive should stop and send out an error message.

PDO Rx/Tx Mapping record

- PDOs from Host to Drive
  - 32 bit reference position [position increment]
  - 16 bit symmetrical difference [increments]

    $\triangle X_i = (X_{i+1} - X_{i-1})/2$ (it is also the same as velocity)
  - 16 bit control word.

PDO from Host to Drive (Every PDO contain 8 bytes field like below)

32 bit reference position	16 bit difference	16 bit controlword

3.2.2 Operation Procedure

① Set【Mode of operations:6060_h】to interpolation position mode(7).

② P1-01 = 0x0B,

Set【Interpolation sub mode select:$60C0_h$】to Interpolation mode.

- If $60C0_h$ is [0] or [-1], Host **needs** to send [60C1h Sub-3] and Drive will work more precisely.
- If $60C0_h$ is [-2], Host **does not need to send** [60C1h Sub-3]. It could save calculating time of Host and Drive could work also.

P1-01 = 0x0C,

Set【Interpolation sub mode select:$60C0_h$】to Interpolation mode.

- If $60C0_h$ is [0], Host does not send [$60C1_h$ Sub-3]. It could save calculating time of host and Drive could work also.
- If $60C0_h$ is [-1], Host need to send [$60C1_h$ Sub-3] and Drive will work more precisely.

③ P1-01 = 0x0B,

- Set【Communication Cycle period:1006_h】 to predict SYNC interval.
  The unit of this object is microsecond.
- It is recommended to set this value for a multiple of 1000 microsecond.

P1-01 = 0x0C,

- Set【Interpolation time period:60C2h】 to predict SYNC receiving period.
- 60C2h Sub-1 for Interpolation time units. The range is from 1ms to 20ms.
  - 60C2h Sub-2 for Interpolation time index. The value is always -3 meaning the interpolation time unit is 10^{-3} second.

④ Set PDO Communication & Mapping parameters via SDO.

Example:

- Set 1400h Sub-1 for PDO RxCobId.
- Set 1400h Sub-2 for PDO receive type [0x01] normally.

If using these steps, Host need to send SYNC and PDO data every Communication cycle.

⑤ Drive PDO Rx:

P1-01 = 0x0B,

- 60C1h Sub-1 for Pos Cmd (Low word)
- 60C1h Sub-2 for Pos Cmd (High word)
- 60C1h Sub-3 for Symmetrical Difference (optional)
- 6040h Sub-0 for ControlWord.

P1-01 = 0x0C,

- 60C1h Sub-1 for Pos Cmd (32-bit)
- 6040h Sub-0 for ControlWord.

⑥ Drive PDO Tx content could be set up to requirements of Host.

⑦ Receive NMT from Host to start or stop operation.

Note：

Because of difference of each oscillator, users must change parameter P3-09 to make drive to automatically modify internal timer to match SYNC object period)

3.2.3 Associated Object List

Index	Name	Type	Attr.
6040h	Controlword	UNSIGNED16	RW
6041h	Statusword	UNSIGNED16	RO
6060h	Modes of operation	INTEGER8	RW
6061h	Modes of operation display	INTEGER8	RO
6093h	Position factor	UNSIGNED32	RW
60C0h	Interpolation sub mode select	INTEGER16	RW
60C1h	Interpolation data record	ARRAY	RW

(Please refer to the following “Details of Objects” section for more detailed descriptions)

3.3 Homing Mode

3.3.1 Description

This mode could help drive to seek the home position. The user can specify the speeds, acceleration and the method of homing.

3.3.2 Operation Procedure

① Set【Mode of operations:6060h】 to homing mode(6).
② Set【Home offset:607Ch】
③ Set【Homing method:6098h】, method range is 1~35. (refer to OD-9098h definition below)
④ Set【Homing speeds:6099h Sub-1】 to set speed during search for switch. (unit: rpm)
⑤ Set【Homing speeds:6099h Sub-2】 to set speed during search for zero. (unit: rpm)
⑥ Set【Homing acceleration:609Ah】 for homing acceleration. (unit: millisecond from 0rpm to 3000rpm)
⑦ Set【Controlword:6040h】 to servo on drive and make motor work.
⑧ Find Home Switch and do homing.
⑨ Query【Statusword:6041h】to get drive status.

3.3.3 Associated Object List

Index	Name	Type	Attr.
6040h	Controlword	UNSIGNED16	RW
6041h	Statusword	UNSIGNED16	RO
6060h	Modes of operation	INTEGER8	RW
6061h	Modes of operation display	INTEGER8	RO
607Ch	Home offset	INTEGER32	RW
6093h	Position factor	UNSIGNED32	RW
6098h	Homing method	INTEGER8	RW
6099h	Homing speeds	ARRAY	RW
609Ah	Homing acceleration	UNSIGNED32	RW

(Please refer to the following “Details of Objects” section for more detailed descriptions)

3.4 Profile Velocity Mode

3.4.1 Description

Drive could receive velocity commands and plan acceleration and deceleration.

3.4.2 Operation Procedure

① Set【Mode of operations:6060h】 to profile velocity mode(3).

② Set【Controlword:6040h】 to servo on drive and make motor work.
(After drive switch to servo-on, internal velocity command will be reset and OD-60FFh will be cleared.)

③ Set【Profile acceleration:6083h】to plan acceleration slope. (millisecond from 0rpm to 3000rpm)

④ Set【Profile deceleration:6084h】to plan deceleration slope. (millisecond from 0rpm to 3000rpm)

⑤ Set【Target velocity:60FFh】. The unit of Target velocity is 0.1rpm.
(If drive already servo-on, the drive will work immediately while receiving velocity command. OD-60FFh will be cleared to zero if OD-6060h[Mode] changed, Servo-Off or Quick-Stop is activated.)

⑥ Query【Statusword:6041h】to get drive status.

3.4.3 advanced

① Host could get information about velocity mode.

- Query【Velocity demand value:606B$_h$】to get internal velocity command. (unit: 0.1rpm)
- Query【Velocity actual value:606C$_h$】to get actual velocity value. (unit: 0.1rpm)

② Host could set velocity monitor threshold.

- Set【Velocity window:606D$_h$】to allocate velocity reached zone. (unit: 0.1rpm)
- Set【Velocity widnow time:606E$_h$】to plan time of activation of velocity reached. (unit: millisecond)
- Set【Velocity threshold:606F$_h$】to allocate zero speed level. (unit: 0.1rpm)

3.4.4 Associated Object List

Index	Name	Type	Attr.
6040$_h$	Controlword	UNSIGNED16	RW
6041$_h$	Statusword	UNSIGNED16	RO
6060$_h$	Modes of operation	INTEGER8	RW
6061$_h$	Modes of operation display	INTEGER8	RO
606B$_h$	Velocity demand value	INTEGER32	RO
606C$_h$	Velocity actual value	INTEGER32	RO

Index	Name	Type	Attr.
$606D_h$	Velocity window	UNSIGNED16	RW
$606E_h$	Velocity window time	UNSIGNED16	RW
$606F_h$	Velocity threshold	UNSIGNED16	RW
$60FF_h$	Target velocity	INTEGER32	RW

(Please refer to the following “Details of Objects” section for more detailed descriptions)

3.5 Profile Torque Mode

3.5.1 Description

Drive could receive torque command and plan profile torque slope.

3.5.2 Operation Procedure

① Set【Mode of operations:6060h】 to profile torque mode(4).

② Set【Controlword:6040h】 to servo on drive and make motor work.
(After drive switches to servo-on, internal torque command will be reset and OD-6071h will be cleared. It means the drive is servo-on, then starts receiving torque command.)

③ Set【Torque slope:6087h】to plan torque slope time. (unit: millisecond from 0 to 100% rated torque)

④ Set【Target torque:6071h】to target torque. The unit is given per thousand of rated torque.
(OD-6071h will be cleared to zero if OD-6060h[Mode] changed, Servo-Off or Quick-Stop is activated.)

3.5.3 Advanced

Host could get information about torque mode.

- Query【Torque demand value:6074_h】to get output value of the torque limit function. (unit: per thousand of rated torque)
- Query【Torque rated current:6075_h】to get the rated current depending on the motor and drive type. (unit: multiples of milliamp)
- Query【Torque actual value:6077_h】to get instantaneous torque in the drive motor. (unit: per thousand of rated torque)
- Query【Current actual value:6078_h】to get instantaneous current in the drive motor. (unit: per thousand of rated current)

3.5.4 Associated Object List

Index	Name	Type	Attr.
6040_h	Controlword	UNSIGNED16	RW
6041_h	Statusword	UNSIGNED16	RO
6060_h	Modes of operation	INTEGER8	RW
6061_h	Modes of operation display	INTEGER8	RO
6071_h	Target torque	INTEGER16	RW
6074_h	Torque demand value	INTEGER16	RO
6075_h	Motor rated current	UNSIGNED32	RO
6077_h	Torque actual value	INTEGER16	RO
6078_h	Current actual value	INTEGER16	RO
6087_h	Torque slope	UNSIGNED32	RW

(Please refer to the following "Details of Objects" section for more detailed descriptions)

4. Object Dictionary Entries

4.1 Specifications for Objects

4.1.1 Object Type

Object Name	Comments
VAR	A single value such as an UNSIGNED8, Boolean, float, INTEGER16 etc.
ARRAY	A multiple data field object where each data field is a sample variable of the SAME basic data type e.g. array of UNSIGNED16 etc. Sub-index 0 is of UNSIGNED8 and therefore not part of the ARRAY data
RECORD	A multiple data field object where the data fields may be any combination of simple variables. Sub-index 0 is of UNSIGNED8 and therefore not part of the RECORD data

4.1.2 Data Type

Please refer to CANopen Standard 301.

4.2 Overview of Object Group 1000_h

Index	Object Type	Name	DataType	Access
1000_h	VAR	device type	UNSIGNED32	RO
1001_h	VAR	error register	UNSIGNED8	RO
1003_h	ARRAY	pre-defined error field	UNSIGNED32	RW
1005_h	VAR	COB-ID SYNC	UNSIGNED32	RW
1006_h	VAR	communication cycle period	UNSIGNED32	RW
$100C_h$	VAR	guard time	UNSIGNED16	RW
$100D_h$	VAR	life time factor	UNSIGNED8	RW
1010_h	ARRAY	store parameters	UNSIGNED32	RW
1011_h	ARRAY	restore default parameters	UNSIGNED32	RW
1014_h	VAR	COB-ID EMCY	UNSIGNED32	RO
1016_h	ARRAY	Consumer heartbeat time	UNSIGNED32	RW
1017_h	VAR	Producer heartbeat time	UNSIGNED16	RW
1018_h	RECORD	Identity Object	UNSIGNED32	RO
1029_h	ARRAY	Error Behavior	UNSIGNED8	RW
1200_h	RECORD	1st Server SDO parameter	SDO Parameter	RO
1400_h~03_h	RECORD	Receive PDO parameter	UNSIGNED16/32	RW
1600_h~03_h	RECORD	Receive PDO mapping	UNSIGNED32	RW
1800_h~03_h	RECORD	Transmit PDO parameter	UNSIGNED16/32	RW
$1A00_h$~03_h	RECORD	Transmit PDO mapping	UNSIGNED32	RW

※ Only 1001_h could be mapped to PDO

4.3 Overview of Object Group 6000_h

Index	Object Type	Name	DataType	Access	Mappable
$603F_h$	VAR	Error Code	UNSIGNED16	RO	Y
6040_h	VAR	Controlword	UNSIGNED16	RW	Y
6041_h	VAR	Statusword	UNSIGNED16	RO	Y
$605B_h$	VAR	Shutdown option code	INTEGER16	RW	N
$605E_h$	VAR	Fault reaction option code	INTEGER16	RW	N
6060_h	VAR	Modes of operation	INTEGER8	RW	Y
6061_h	VAR	Modes of operation display	INTEGER8	RO	Y
6062_h	VAR	Position demand value [PUU]	INTEGER32	RO	Y
6063_h	VAR	Position actual value [increment]	INTEGER32	RO	Y
6064_h	VAR	Position actual value	INTEGER32	RO	Y
6065_h	VAR	Following error window	UNSIGNED32	RW	Y
6067_h	VAR	Position windows	UNSIGNED32	RW	Y
6068_h	VAR	Position window time	UNSIGNED16	RW	Y

Index	Object Type	Name	DataType	Access	Mappable
$606B_h$	VAR	Velocity demand value	INTEGER32	RO	Y
$606C_h$	VAR	Velocity actual value	INTEGER32	RO	Y
$606D_h$	VAR	Velocity window	UNSIGNED16	RW	Y
$606E_h$	VAR	Velocity window time	UNSIGNED16	RW	Y
$606F_h$	VAR	Velocity threshold	UNSIGNED16	RW	Y
6071_h	VAR	Target torque	INTEGER16	RW	Y
6074_h	VAR	Torque demand value	INTEGER16	RO	Y
6075_h	VAR	Motor rated current	UNSIGNED32	RO	Y
6076_h	VAR	Motor rated torque	UNSIGNED32	RO	Y
6077_h	VAR	Torque actual value	UNSIGNED16	RO	Y
6078_h	VAR	Current actual value	INTEGER16	RO	Y
$607A_h$	VAR	Target position	INTEGER32	RW	Y
$607C_h$	VAR	Home Offset	INTEGER32	RW	Y
$607D_h$	ARRAY	Software position limit	INTEGER32	RW	Y
$607F_h$	VAR	Max profile velocity	UNSIGNED32	RW	Y
6080_h	VAR	Max motor speed	UNSIGNED32	RW	Y
6081_h	VAR	Profile velocity	UNSIGNED32	RW	Y
6083_h	VAR	Profile acceleration	UNSIGNED32	RW	Y
6084_h	VAR	Profile deceleration	UNSIGNED32	RW	Y
6085_h	VAR	Quick stop deceleration	UNSIGNED32	RW	Y
6086_h	VAR	Motion profile type	INTEGER16	RW	Y
6087_h	VAR	Torque slope	UNSIGNED32	RW	Y
6093_h	ARRAY	Position factor	UNSIGNED32	RW	Y
6098_h	VAR	Homing method	INTEGER8	RW	Y
6099_h	ARRAY	Homing speeds	UNSIGNED32	RW	Y
$609A_h$	VAR	Homing acceleration	UNSIGNED32	RW	Y
$60B0_h$	VAR	Position offset	INTEGER32	RW	Y
$60B1_h$	VAR	Velocity offset	INTEGER32	RW	Y
$60B2_h$	VAR	Torque offset	INTEGER16	RW	Y
$60C0_h$	VAR	Interpolation sub mode select	INTEGER16	RW	Y
$60C1_h$	ARRAY	Interpolation data record	UNSIGNED16/32	RW	Y
$60C2_h$	RECORD	Interpolation time period	SIGNED8	RW	Y
$60C5_h$	VAR	Max acceleration	UNSIGNED32	RW	Y
$60C6_h$	VAR	Max deceleration	UNSIGNED32	RW	Y
$60F2_h$	VAR	Positioning option code	UNSIGNED16	RW	Y
$60F4_h$	VAR	Following error actual value	INTEGER32	RO	Y
$60FC_h$	VAR	Position demand value	INTEGER32	RO	Y

Index	Object Type	Name	DataType	Access	Mappable
$60FD_h$	VAR	Digital inputs	UNSIGNED32	RO	Y
$60FF_h$	VAR	Target velocity	INTEGER32	RW	Y
6502_h	VAR	Supported drive modes	UNSIGNED32	RO	Y
Delta parameter definition					
2xxx	VAR	Parameter Mapping	INTEGER16/32	RW	Y

4.4 Details of Objects

Object 1000_h: Device Type

INDEX	1000_h
Name	device type
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	04020192_h : A2 Series 06020192_h : M Series

Object 1001_h: Error Register

INDEX	1001_h
Name	error register
Object Code	VAR
Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED8
Default Value	0

Object 1003_h: Pre-defined Error Field

INDEX	1003_h
Name	pre-defined error field
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Sub-Index	0
Description	number of errors
Data Type	UNSIGNED8

Access	RW
PDO Mapping	No
Value Range	0~5
Default Value	0

Sub-Index	1~5
Description	standard error field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Example: if AL.011 occurs, the errorcode will store in Array of 1003_h

Byte: MSB LSB

Additional Information(UINT16)	Error code(UINT16)
0x0011 (AL.011)	0x7305

Object 1005_h: COB-ID SYNC message

INDEX	1005_h
Name	COB-ID SYNC message
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80_h

Object 1006_h: Communication Cycle Period

INDEX	1006_h
Name	communication cycle period
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: microsecond

Object 100C$_h$: Guard Time

INDEX	100C$_h$
Name	guard time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: millisecond

Object 100D$_h$: Life Time Factor

INDEX	100D$_h$
Name	life time factor
Object Code	VAR
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Object 1010$_h$: Store parameters

INDEX	1010$_h$
Name	store parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	save all default parameters
Data Type	UNSIGNED32

Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1

	MSB			LSB
ASCII	e	v	a	s
hex	65h	76h	61h	73h

Signature

Object 1011$_h$: Restore default parameters

INDEX	1011$_h$
Name	restore default parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	restore all default parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1

	MSB			LSB
ASCII	d	a	o	l
hex	64h	61h	6Fh	6Ch

Signature

Object 1014_h: COB-ID Emergency Object

INDEX	1014_h
Name	COB-ID Emergency message
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80_h + Node-ID

UNSIGNED32

	MSB		LSB
bits	31	30~11	10~0
	0/1	00000000000000000000	11-bit Identifier COB-ID

Bit31 is 0 means that EMCY is valid (Drive will send EMCY)

Bit31 is 1 means that EMCY is not valid (Drive will not send EMCY)

Object 1016_h: Consumer Heartbeat Time

INDEX	1016_h
Name	Consumer Heartbeat Time
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	number entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	Consumer Heartbeat Time
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

UNSIGNED32

	MSB	LSB
31~24	23~16	15~0
Reserved (value:00h)	Node-ID	Heartbeat time (Unit:millisecond)
-	UNSIGNED8	UNSIGNED8

Object 1017$_h$: Producer Heartbeat Time

INDEX	1017$_h$
Name	Producer Heartbeat Time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Object 1018$_h$: Identity Object

INDEX	1018$_h$
Name	Identity Object
Object Code	RECORD
Data Type	Identity
Access	RO
PDO Mapping	No

Sub-Index	0
Description	number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	3
Default Value	3
Sub-Index	1
Description	Vendor ID
Data Type	UNSIGNED32
Access	RO

PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1DD $_h$

Sub-Index	2
Description	Product code
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	6000 $_h$: A2 Series 6030$_h$: M Series

Sub-Index	3
Description	Revision number
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	N/A

Object 1029$_h$: Error Behavior

INDEX	1029$_h$
Name	Error Behavior
Object Code	ARRAY
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No

Sub-Index	0
Description	No. of Error Classes
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	Communication Error
Data Type	UNSIGNED8

Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Note:

0 Pre-operational (only if current is operational)

1 No state change

2 stopped

Object 1200$_h$: Server SDO Parameter

INDEX	1200$_h$
Name	Server PDO parameter
Object Code	RECORD
Data Type	SDO Parameter
Access	RO
PDO Mapping	No

Sub-Index	0
Description	number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

Sub-Index	1
Description	COB-ID Client->Server (rx)
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	Index 1200$_h$: 600$_h$ + Node-ID

Sub-Index	2
Description	COB-ID Server->Client (tx)
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32

Default Value	Index 1200 $_h$: 580 $_h$ + Node-ID

Object 1400$_h$ ~ 1403$_h$: Receive PDO Communication Parameter

INDEX	1400$_h$ ~ 1403$_h$
Name	Receive PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Access	RW
PDO Mapping	No

Sub-Index	0
Description	largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	5
Default Value	5

Sub-Index	1
Description	COB-ID used by PDO
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	Default Node-ID: 0 Index 1400 $_h$: 200 $_h$ + Node-ID Index 1401 $_h$: 300 $_h$ + Node-ID Index 1402 $_h$: 400 $_h$ + Node-ID Index 1403 $_h$: 500 $_h$ + Node-ID

UNSIGNED32

		MSB	LSB
bits	31	30~11	10~0
	0/1	00000000000000000000	11-bit Identifier COB-ID

Bit31 is 0 means that PDO is valid

Bit31 is 1 means that PDO is not valid

The PDO valid/not valid allows to select which PDOs are used in the operational state.

Sub-Index	2
Description	Reception type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	3
Description	inhibit time (not used for RPOD)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Sub-Index	4
Description	compatibility entry
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

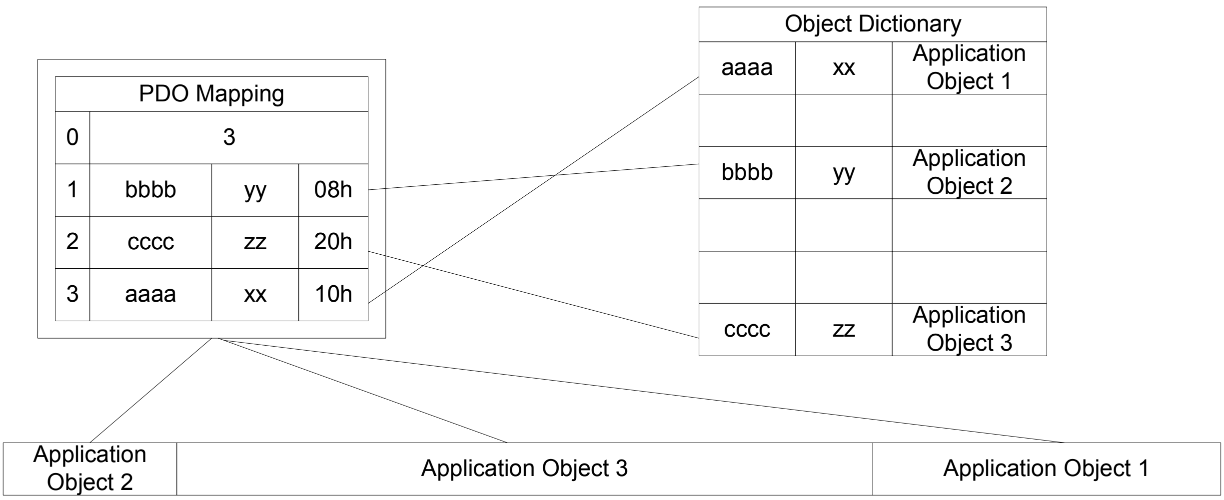
Sub-Index	5
Description	event timer (not used for RPDO)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Object 1600_h ~ 1603_h: Receive PDO Mapping Parameter

INDEX	1600_h ~ 1603_h
Name	Receive PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of mapped application objects in PDO
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	0: deactivated 1~8: activated
Default Value	0

Sub-Index	1~8
Description	PDO mapping for the nth application object to be mapped
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0



Object 1800$_h$ ~ 1803$_h$: Transmit PDO Communication Parameter

INDEX	1800$_h$ ~ 1803$_h$
Name	transmit PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Access	RW
PDO Mapping	No

Sub-Index	0
Description	largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	5
Default Value	5

Sub-Index	1
Description	COB-ID used by PDO
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	Default Node-ID: 0 Index 1800_h: 180_h + Node-ID Index 1801_h: 280_h + Node-ID Index 1802_h: 380_h + Node-ID Index 1803_h: 480_h + Node-ID

UNSIGNED32

		MSB	LSB
bits	31	30~11	10~0
	0/1	00000000000000000000	11-bit Identifier COB-ID

Bit31 is 0 means that PDO is valid

Bit31 is 1 means that PDO is not valid

The PDO valid/not valid allows to select which PDOs are used in the operational state.

Sub-Index	2
Description	Transmission type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	3
Description	inhibit time
Data Type	UNSIGNED16

Access	RW
PDO Mapping	No
Value Range	UNSIGNED16
Default Value	0

Sub-Index	4
Description	reserved
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	5
Description	event timer
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	0: not used UNSIGNED16
Default Value	0

Object 1A00$_h$ ~ 1A03$_h$: Transmit PDO Mapping Parameter

INDEX	1A00$_h$ ~ 1A03$_h$
Name	Transmit PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of mapped application objects in PDO
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	0: deactivated 1~8: activated
Default Value	0

Sub-Index	1~8

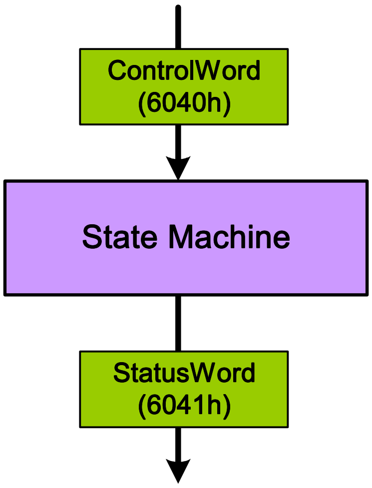
Description	PDO mapping for the nth application object to be mapped
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Object 603F$_h$: Error code (errorcode of CANopen defined)

INDEX	603F$_h$
Name	Error code
Object Code	VAR
Data Type	UNSIGNED16
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0

Object 6040$_h$: Controlword

INDEX	6040$_h$
Name	Controlword
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	P1-01 = 0x0B, Default is 0x0000 P1-01 = 0x0C, Default is 0x0004



State machine in system context

Bit Definition

15~9	8	7	6~4	3	2	1	0
N/A	Halt	Fault reset	Operation mode specific	Enable operation	Quick Stop (B-contact)	Enable voltage	Switch on

Note：

If P1-01 = 0x0B, user could set 6040h to 0x000F for ServoOn immediately.

If P1-01 = 0x0C, user need to set 6040h to 0x0006->0x0007->0x000F for Servo On step by step.

Bit	Operation mode				
	PP	HM	IP	PV	PT
4	New set-point (positive trigger)	Homing operation start (positive trigger)	N/A	N/A	N/A
5	Change set immediately	N/A	N/A	N/A	N/A
6	Absolute(0) / relative(1)	N/A	N/A	N/A	N/A

Abbreviation:

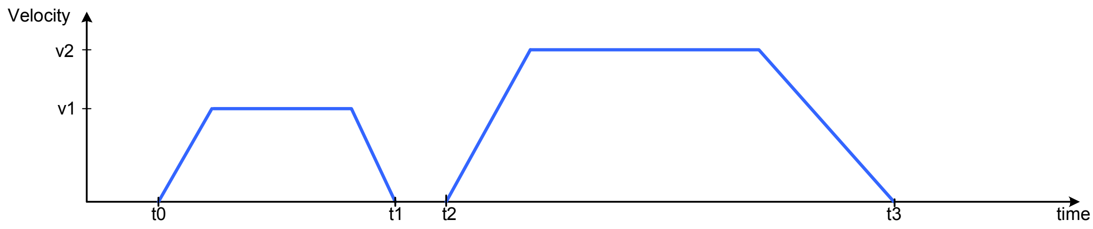
PP Profile Position Mode

HM Homing Mode

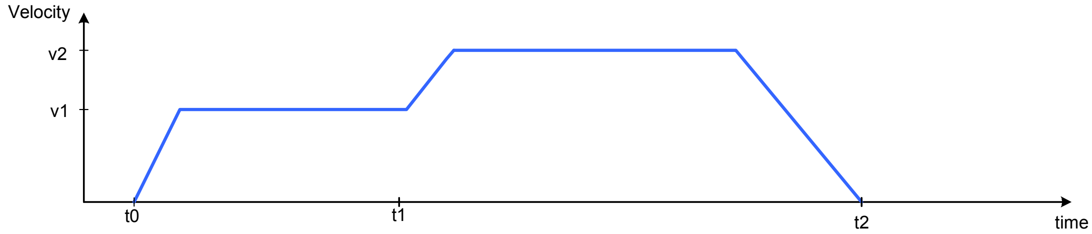
IP Interpolated Position Mode

PV Profile Velocity Mode

PT Profile Torque Mode



Single set-point



Change settings immediately

Object 6041$_h$: Statusword

INDEX	6041$_h$
Name	Statusword
Object Code	VAR
Data Type	UNSIGNED16
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0

Data Description

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

MSB LSB

Bit Definition

0	Ready to swtich on
1	Switch on
2	Operation enabled (status of servo on)
3	Fault (Drive will servo off)
4	Voltage enabled
5	Quick stop
6	Switch on disabled
7	Warning (drive still servo on)
8	N/A
9	Remote
10	Target reached
11	Internal limit active (Not supported)

	PP	HM	IP	PV	PT
12	Set-point acknowledge	Homing attained	IP mode active	Zero Speed	N/A
13	Following error	Homing error	N/A	N/A	N/A
14	N/A	N/A	SYNC OK	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A

Note:

Set-point acknowledge: Trajectory generator has assumed the positioning values

Homing attained: Homing mode carried out successfully

IP mode active: interpolated position mode active – mode is running in IP mode

SYNC OK: SYNC frame is reached before path generator starts

Object 605B$_h$: Shutdown option code

INDEX	605B$_h$
Name	Shutdown option code
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	0:Disable drive function -1:Dynamic break enable

Object 605E$_h$: Fault reaction option code

INDEX	605E$_h$
Name	Fault reaction option code
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	2
Comment	0:Disable drive, motor is free to rotate 1:slow down on slow down ramp 2:slow down on quick stop ramp

Object 6060$_h$: Modes of operation

INDEX	6060$_h$
Name	Modes of operation
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	INTEGER8
Default Value	0
Comment	0:Reserved 1:Profile position mode 3:Profile velocity mode 4:Profile torque mode 6:Homing mode 7:Interpolated position mode

Object 6061$_h$: Modes of operation display

INDEX	6061$_h$
Name	Modes of operation display
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	INTEGER8
Default Value	0

Object 6062$_h$: Position demand value

INDEX	6062$_h$
Name	Position demand value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Position command calculated by Interpolation theory Unit: PUU

Object 6063$_h$: Position demand value

INDEX	6063$_h$
Name	Position actual value*
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit: increments

Object 6064$_h$: Position actual value

INDEX	6064$_h$
Name	Position actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit: PUU

Object 6065$_h$: Following error window

INDEX	6065$_h$
Name	Following error window
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	3840000
Comment	Unit: PUU

Object 6067$_h$: Position window

INDEX	6067$_h$
Name	Position window
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes

Value Range	UNSIGNED32
Default Value	100
Comment	Unit: PUU

Object 6068$_h$: Position window time

INDEX	6068$_h$
Name	Position window time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: millisecond

Object 606B$_h$: Velocity demand value

INDEX	606B$_h$
Name	Velocity demand value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 606C$_h$: Velocity actual value

INDEX	606C$_h$
Name	Velocity actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 606D$_h$: Velocity window

INDEX	606D$_h$
Name	Velocity window
Object Code	VAR
Data Type	INTEGER16
Access	RO
PDO Mapping	Yes
Value Range	0~3000
Default Value	100
Comment	Unit: 0.1rpm

Object 606E$_h$: Velocity window time

INDEX	606E$_h$
Name	Velocity window time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: millisecond

Object 606F$_h$: Velocity threshold

INDEX	606F$_h$
Name	Velocity threshold
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	0~2000
Default Value	100
Comment	Unit: 0.1rpm

Object 6071$_h$: Target torque

INDEX	6071$_h$
Name	Target torque
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes

Value Range	-3000~3000
Default Value	0
Comment	Unit: per thousand of rated torque

Object 6074$_h$: Torque demand value

INDEX	6074$_h$
Name	Torque demand value
Object Code	VAR
Data Type	INTEGER16
Access	RO
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rated torque

Object 6075$_h$: Motor rated current

INDEX	6075$_h$
Name	Motor rated current
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED32
Comment	Unit: milliamp

Object 6076$_h$: Motor rated toruqe

INDEX	6076$_h$
Name	Motor rated torque
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED32
Comment	Unit: per thousand of rate torque

Object 6077$_h$: Torque actual value

INDEX	6077$_h$
Name	Torque actual value
Object Code	VAR
Data Type	INTEGER16
Access	RO

PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rate torque

Object 6078$_h$: Current actual value

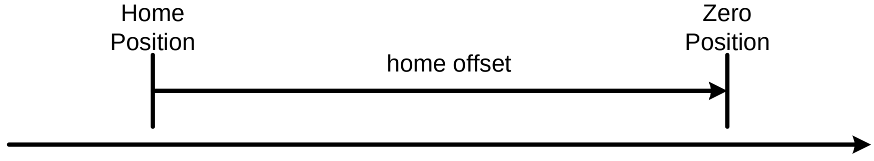
INDEX	6078$_h$
Name	Current actual value
Object Code	VAR
Data Type	INTEGER16
Access	RO
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rated current

Object 607A$_h$: Target position

INDEX	607A$_h$
Name	Target position
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	For Profile position mode 6060$_h$=1 Unit: PUU

Object 607C$_h$: Home offset

INDEX	607C$_h$
Name	Home offset
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit : PUU



Home offset

Object 607F$_h$: Max profile velocity

INDEX	607F$_h$
Name	Max profile velocity
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	P1-55(rpm) * 10
Comment	Unit:0.1rpm

Object 6080$_h$: Max motor speed

INDEX	6080$_h$
Name	Max motor speed
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	P1-55(rpm)
Comment	Unit:rpm

Object 6081$_h$: Profile velocity

INDEX	6081$_h$
Name	Profile Velocity
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	10000
Comment	For Profile position mode 6060$_h$=1 Unit: PUU per second

Object 6083$_h$: Profile acceleration

INDEX	6083h
Name	Profile acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~UNSIGNED32
Default Value	200
Comment	For Profile position mode 6060h=1 Unit: millisecond (time from 0rpm to 3000rpm)

Object 6084$_h$: Profile deceleration

INDEX	6084$_h$
Name	Profile deceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~UNSIGNED32
Default Value	200
Comment	For Profile position mode 6060$_h$=1 Unit: millisecond (time from 0rpm to 3000rpm)

Object 6085$_h$: Quick stop deceleration

INDEX	6085$_h$
Name	Quick stop acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: millisecond (time from 0rpm to 3000rpm)

Object 6086$_h$: Motion profile type

INDEX	6086$_h$
Name	Motion profile type
Object Code	VAR
Data Type	INTEGER16

Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0

Object 6087$_h$: Torque slope

INDEX	6087$_h$
Name	Torque slope
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: millisecond (time from 0 to 100％ rated torque)

Object 6093$_h$: Position factor

INDEX	6093$_h$
Name	Position factor
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Comment	Position factor = Numerator / Feed_constant

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

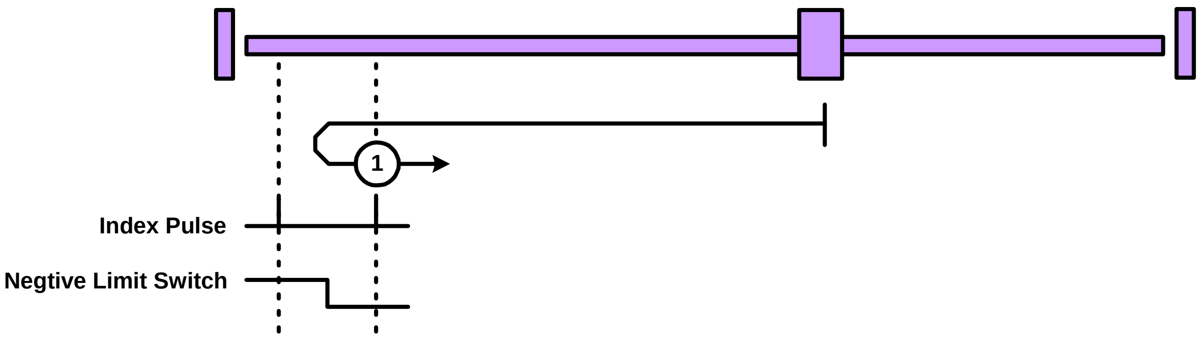
Sub-Index	1
Description	Numerator
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes

Default Value	1
Comment	Same as P1-44

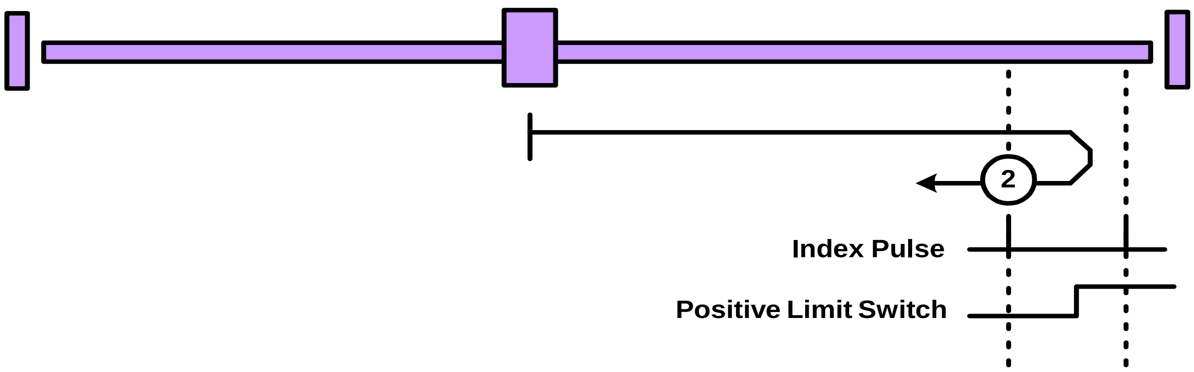
Sub-Index	2
Description	Feed_constant
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Default Value	1
Comment	Same as P1-45

Object 6098$_h$: Homing method

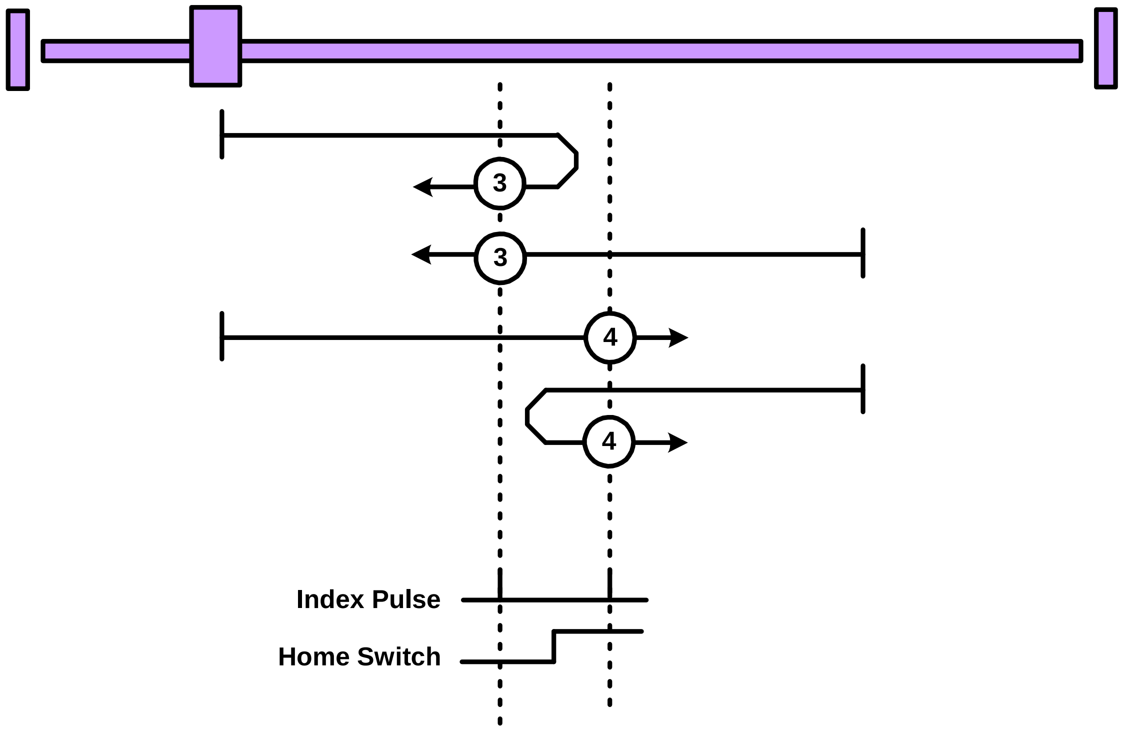
INDEX	6098$_h$
Name	Homing method
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	0~35
Default Value	0



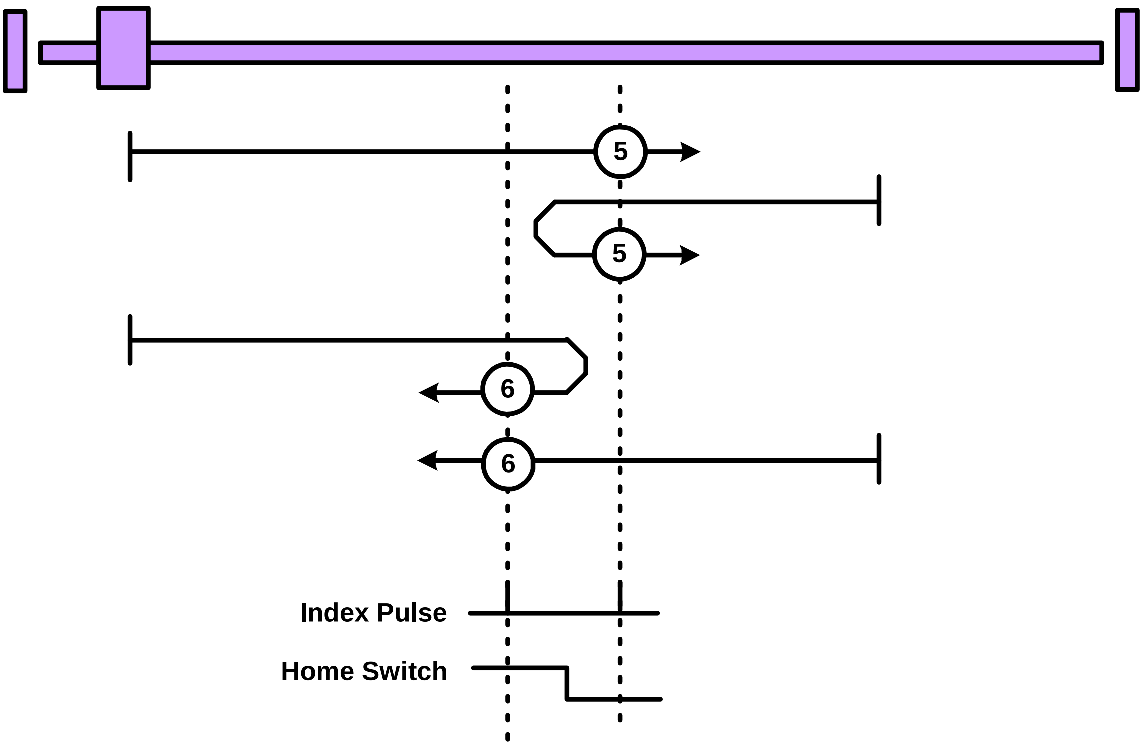
Method1：Homing on the negative limit switch and index pulse



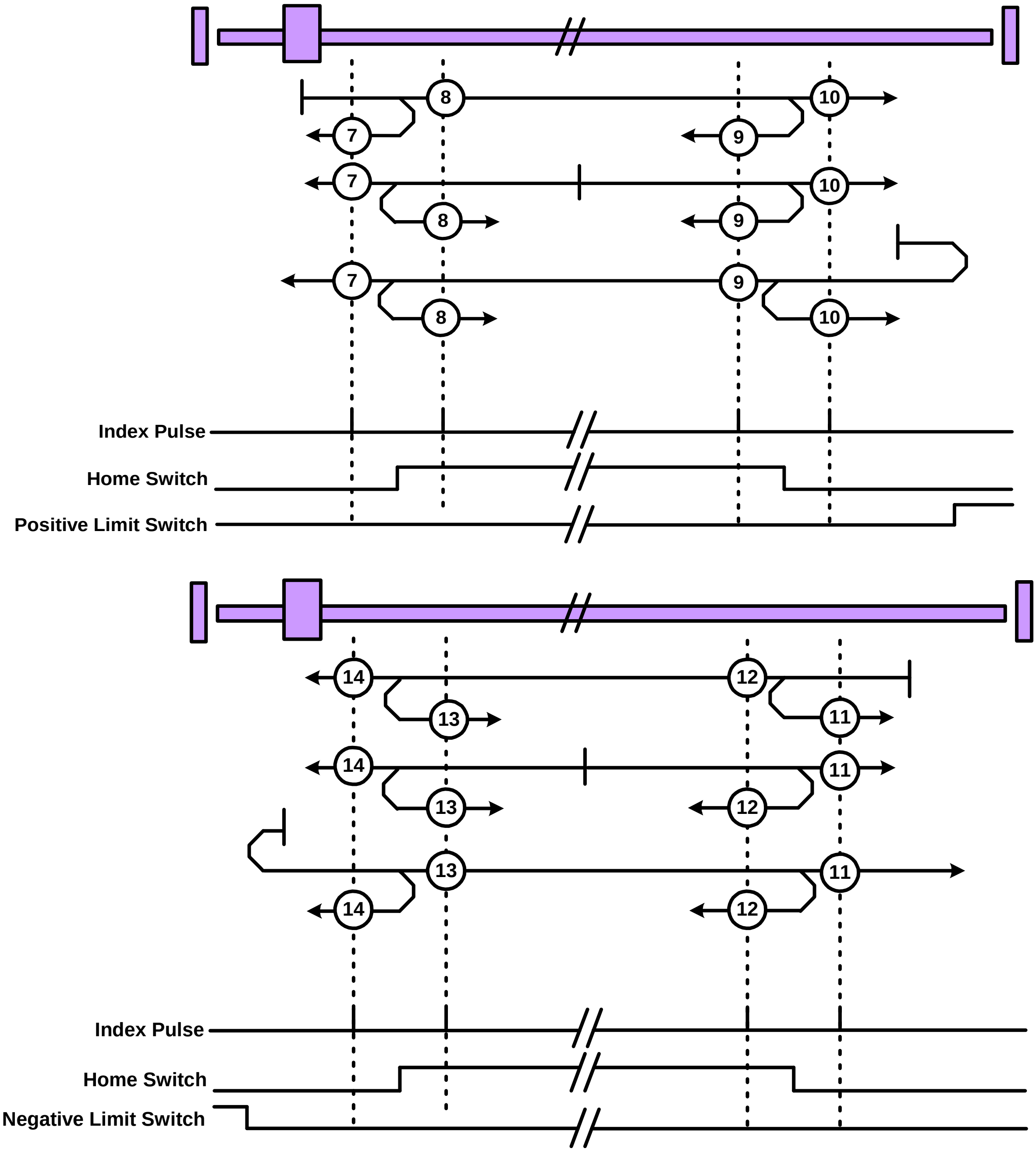
Method2：Homing on the positive limit switch and index pulse



Method 3 and 4：Homing on the positive home switch and index pulse

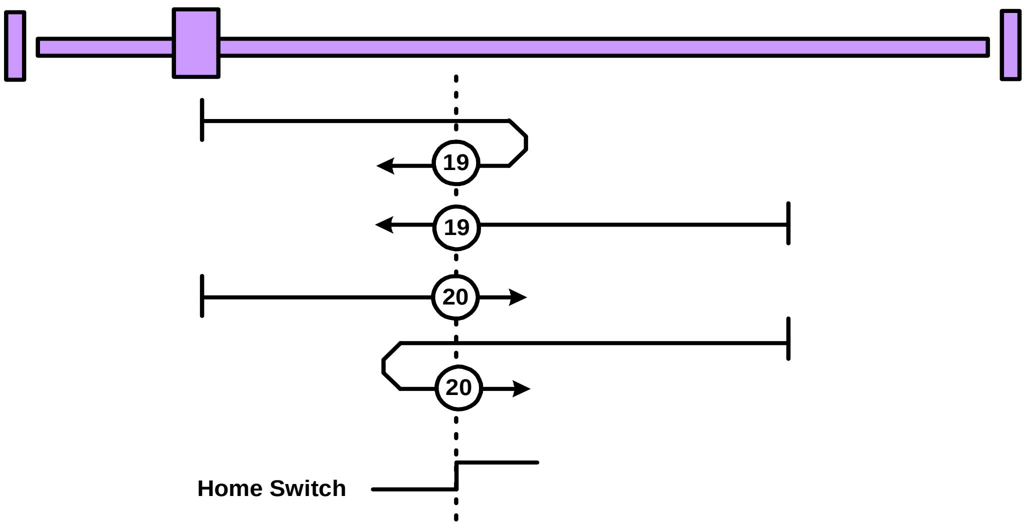


Method 5 and 6：Homing on the negative home switch and index pulse



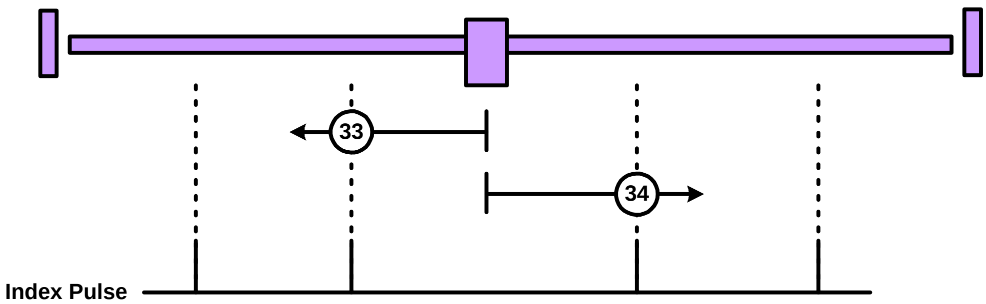
Method 7 to 14：Homing on the home switch and index pulse

Method 15 and 16：Reserved (no picture)



Method 17 to 30：Homing without an index pulse

Method 31 and 32：Reserved (no picture)



Method 33 to 34：Homing on the index pulse

Method 35：Homing on the current position (no picture)

Object 6099$_h$: Homing speeds

INDEX	6099$_h$
Name	Homing speeds
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Value Range	2
Default Value	2

Sub-Index	1
Description	Speed during search for switch
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~2000rpm
Default Value	100
Comment	P1-01 = 0x0B, Uint:rpm P1-01 = 0x0C, Uint:0.1rpm

Sub-Index	2
Description	Speed during search for zero
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~500rpm
Default Value	20
Comment	P1-01 = 0x0B, Uint:rpm P1-01 = 0x0C, Uint:0.1rpm

Object 609A$_h$: Homing acceleration

INDEX	609A$_h$
Name	Homing acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	100
Comment	Unit: millisecond (time of acc from 0rpm to 3000rpm)

Object 60B0$_h$: Position offset

INDEX	60B0$_h$
Name	Position offset
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32

Default Value	0
Comment	Not implement yet.

Object 60B1$_h$: Velocity offset

INDEX	60B1$_h$
Name	Velocity offset
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Not implement yet.

Object 60B2$_h$: Torque offset

INDEX	60B2$_h$
Name	Torque offset
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	Not implement yet.

Object 60C0$_h$: Interpolation sub mode select

INDEX	60C0$_h$
Name	Interpolation sub mode select
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	**P1-01 = 0x0B**, 0, -1: manufacturer specific (Delta definition -- need pos difference[OD-60C1sub3]) -2: manufacturer specific (Linear interpolation --

	not need pos difference[OD-60C1sub3]) **P1-01 = 0x0C**, 0: manufacturer specific (Linear interpolation -- **not** need pos difference[OD-60C1sub2]) -1: manufacturer specific (Delta definition -- need pos difference[OD-60C1sub2])

P1-01 = 0x0B,

Object 60C1$_h$: Interpolation data record

INDEX	60C1$_h$
Name	Interpolation data record
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Comment	Set this record by PDO every ***T*** msec before SYNC message Where ***T*** is specified by 1006$_h$

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	3
Default Value	3

Sub-Index	1
Description	Pos_Cmd (Low Word)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: low word of 32-bit CMD_PUU

Sub-Index	2

Description	Pos_Cmd (High Word)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: high word of 32-bit CMD_PUU

Sub-Index	3
Description	Velocity – Pos_Cmd difference
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	$\triangle X_i = (X_{i+1} - X_{i-1})/2$ (it is also the same as velocity) Unit: PUU

P1-01 = 0x0C,

Object 60C1$_h$: Interpolation data record

INDEX	60C1$_h$
Name	Interpolation data record
Object Code	ARRAY
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Comment	Set this record by PDO every ***T*** msec before SYNC message Where ***T*** is specified by 60C2$_h$:01$_h$

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

Sub-Index	1
Description	Pos_Cmd
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit: 32-bit CMD_PUU
Sub-Index	2
Description	Velocity – Pos_Cmd difference
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	$\triangle X_i = (X_{i+1} - X_{i-1})/2$ (it is also the same as velocity) Unit: PUU

Object 60C2$_h$: Interpolation time period

INDEX	60C2$_h$
Name	Interpolation time period
Object Code	RECORD
Data Type	UNSIGNED8
Access	RW
PDO Mapping	Yes
Comment	The unit of ***the interpolation time unit*** is given in $10^{\textit{interpolation time index}}$ seconds

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

Sub-Index	1
Description	Interpolation time units
Data Type	UNSIGNED8

Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED8
Default Value	1

Sub-Index	2
Description	Interpolation time index
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	-128~63
Default Value	-3

Object 60C5$_h$: Max acceleration

INDEX	60C5$_h$
Name	Max acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	200

Object 60C6$_h$: Max deceleration

INDEX	60C6$_h$
Name	Max deceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	200

Object 60F2$_h$: Positioning option code

INDEX	60F2$_h$
Name	Positioning option code
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes

Value Range	UNSIGNED16
Default Value	0

Object 60F4$_h$: Following error actual value

INDEX	60F4$_h$
Name	Following error actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: PUU

Object 60FC$_h$: Position demand value*

INDEX	60FC$_h$
Name	Position demand value*
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: increment

Object 60FF$_h$: Target velocity

INDEX	60FF$_h$
Name	Target velocity
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 6502$_h$: Supported drive modes

INDEX	6502$_h$
Name	Supported drive modes
Object Code	VAR
Data Type	UNSIGNED32
Access	Ro
PDO Mapping	Yes

Value Range	UNSIGNED32
Default Value	$6D_h$

31						16	15		7	6	5	4	3	2	1	0
Manufacturer specific							reserved			ip	hm	reserved	tq	pv	vl	pp
MSB																LSB

Object $2xxx_h$: Manufacturer parameter

INDEX	$2xxx_h$
Name	Manufacturer parameter
Object Code	VAR
Data Type	INTEGER16/INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	NTEGER16/INTEGER32
Default Value	N/A

Object 2xxx is defined to parameter.

If user wants to use CANopen protocol for simulate Keypad press, he or she could read and write Keypad parameter via SDO protocol.

Pa-bc <==> $2aBC_h$

'**BC'** is hexadecimal format of '**bc**'

User could query Index first for knowing Length of Parameter and then could change the data by SDO or PDO.

Example 1:

Object 2300_h: Node-ID 【P3-00】

INDEX	2300_h
Name	Node-ID
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	$7F_h$

Example 2:

Object $212C_h$: Electronic Gear 【P1-44】

INDEX	$212C_h$
Name	Electronic Gear
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32

5 Diagnostics and Troubleshooting

5.1 CANopen Communication Fault Messages

Emergency Object

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code		Error register	Panel Alarm Code		N/A		

Fault Messages (If ALARM code is not showed here, please refer to User Manual)			
Display	**Fault Name**	**Fault Description**	**Clearing Method**
AL185	CANbus error (Warning)	CANbus off or Error Tx Counter exceeds 128.	NMT-ResetNode or 6040h fault reset (Check enough bandwidth)
AL186	CANbus error (Bus-Off)	CANbus off or Error Tx Counter exceeds 255.	NMT-ResetNode or 6040h fault reset (Check enough bandwidth)
AL170	Node guarding or Heartbeat error (Servo On)	Error about node guarding or heartbeat of CANopen protocol	NMT-ResetNode or 6040h fault reset
AL180	Node guarding or Heartbeat error (Servo Off)	Error about node guarding or heartbeat of CANopen protocol	NMT-ResetNode or 6040h fault reset
AL111	CANopen SDO receive buffer overrun	SDO Rx buffer overrun is detected (receive two or more SDO packets in 1ms).	NMT-ResetNode or 6040h fault reset
AL112	CANopen PDO receive buffer overrun	PDO Rx buffer overrun is detected (receive two or more PDO (same COBID) packets in 1ms).	NMT-ResetNode or 6040h fault reset

AL121	Index error occurs when accessing CANopen PDO object.	The specified Index in the message does not exist.	NMT-ResetNode or 6040h fault reset
AL122	Sub-index error occurs when accessing CANopen PDO object.	The specified Sub-index in the message does not exist.	NMT-ResetNode or 6040h fault reset
AL123	Data type (size) error occurs when accessing CANopen PDO object.	The data length in the message does not match the specified object.	NMT-ResetNode or 6040h fault reset
AL124	Data range error occurs when accessing CANopen PDO object.	The data in the message has exceeded the data range of the specified object.	NMT-ResetNode or 6040h fault reset
AL125	CANopen PDO object is read-only and write-protected.	The specified object in the message is read-only and write-protected (cannot be changed).	NMT-ResetNode or 6040h fault reset
AL126	CANopen PDO object does not support PDO.	The specified object in the message does not support PDO.	NMT-ResetNode or 6040h fault reset
AL127	CANopen PDO object is write-protected when Servo On.	The specified object in the message is write-protected (cannot be changed) when Servo On.	NMT-ResetNode or 6040h fault reset
AL128	Error occurs when reading CANopen PDO object from EE-PROM.	An error occurs when loading the default settings from EE-PROM at start-up. All CANopen objects return to their default settings automatically.	NMT-ResetNode or 6040h fault reset
AL129	Error occurs when writing CANopen PDO object into EE-PROM.	An error occurs when writing the current settings into EE-PROM.	NMT-ResetNode or 6040h fault reset
AL130	EE-PROM invalid address range	The amount of the data saved in EE-PROM has exceeded the space determined by the firmware. Maybe the firmware version has been upgraded, and it causes that the data of old firmware version saved in EE-PROM cannot be used.	NMT-ResetNode or 6040h fault reset
AL131	EE-PROM checksum error	The data saved in EE-PROM has been damaged and all CANopen objects return to their default settings automatically.	NMT-ResetNode or 6040h fault reset
AL132	Password error	The parameter is password protected when using CANopen communication to access the parameter. The users must enter the valid password to unlock the parameter.	NMT-ResetNode or 6040h fault reset
AL201	CANopen load/save 1010/1011 error	Fail while Read/Write data from/to EEPROM	P2-08 = 10 or P2-08 = 30,28 after firmware upgrade
AL301	CANopen SYNC failed (Servo On)	The synchronous communication with the external controller has failed.	NMT-ResetNode or 6040h fault reset
AL302	CANopen SYNC signal error (Servo On)	The CANopen SYNC signal is received too early.	NMT-ResetNode or 6040h fault reset

AL303	CANopen SYNC time out (Servo On)	The CANopen SYNC signal is not received within the specified time.	NMT-ResetNode or 6040h fault reset
AL304	CANopen IP command failed (Servo On)	Internal command of CANopen IP mode cannot be sent and received.	NMT-ResetNode or 6040h fault reset
AL305	SYNC period error (Servo On)	Object 0x1006 data error. SYNC period 1006h value is invalid.	NMT-ResetNode or 6040h fault reset
AL3E1	CANopen SYNC failed (Servo Off)	The synchronous communication with the external controller has failed.	NMT-ResetNode or 6040h fault reset
AL3E2	CANopen SYNC signal error (Servo Off)	The CANopen SYNC signal is received too early.	NMT-ResetNode or 6040h fault reset
AL3E3	CANopen SYNC time out (Servo Off)	The CANopen SYNC signal is not received within the specified time.	NMT-ResetNode or 6040h fault reset
AL3E4	CANopen IP command failed (Servo Off)	Internal command of CANopen IP mode cannot be sent and received.	NMT-ResetNode or 6040h fault reset
AL3E5	SYNC period error (Servo Off)	Object 0x1006 data error. SYNC period 1006h value is invalid.	NMT-ResetNode or 6040h fault reset
AL401	CANopen state error	NMT reset or NMT stop is received when drive is enabled	NMT-ResetNode or 6040h fault reset

5.2 Error Code Table

Display	Description	32bit-ErrorCode (16bit-ErrorCode + 16bit-Additional Info)
AL001	Overcurrent	2310-0001$_h$
AL002	Overvoltage	3110-0002$_h$
AL003	Undervoltage	3120-0003$_h$
AL004	Motor error	7122-0004$_h$
AL005	Regeneration error	3210-0005$_h$
AL006	Overload	3230-0006$_h$
AL007	Overspeed	8400-0007$_h$
AL008	Abnormal pulse control command	8600-0008$_h$
AL009	Excessive deviation	8611-0009$_h$
AL010	Reserved	0000-0010$_h$
AL011	Encoder error	7305-0011$_h$
AL012	Adjustment error	6320-0012$_h$

AL013	Emergency stop activated	5441-0013$_h$
AL014	Reverse limit switch error	5443-0014$_h$
AL015	Forward limit switch error	5442-0015$_h$
AL016	IGBT temperature error	4210-0016$_h$
AL017	Memory error	5330-0017$_h$
AL018	Encoder output error	7306-0018$_h$
AL019	Serial communication error	7510-0019$_h$
AL020	Serial communication time out	7520-0020$_h$
AL021	Reserved	Reserved
AL022	Input power phase loss	3130-0022$_h$
AL023	Pre-overload warning	3231-0023$_h$
AL024	Encoder initial magnetic field error	7305-0024$_h$
AL025	Encoder internal error	7305-0025$_h$
AL026	Encoder internal error	7305-0026$_h$
AL027	Encoder data error	7305-0027$_h$
AL030	Motor protection error	7121-0030$_h$
AL031	U,V,W wiring error	3300-0031$_h$
AL040	Ful closed-loop excessive deviation	8610-0040$_h$
AL099	DSP firmware upgrade	5500-0099h
AL201	CANopen Data Initial Error	6310-0201$_h$
AL283	Forward software limit	5444-0283$_h$
AL285	Reverse software limit	5445-0285$_h$
AL185	CANbus error (Warning) (Servo On / Servo off according to setting)	8120-0185$_h$
AL186	CANbus error (Bus-off) (Servo On / Servo off according to setting)	8100-0186$_h$
AL170	Node guarding or Heartbeat error (Servo On)	8130-0170$_h$
AL180	Node guarding or Heartbeat error (Servo Off)	8130-0180$_h$
AL111	CANopen SDO receive buffer overrun	8110-0111$_h$
AL112	CANopen PDO receive buffer overrun	8110-0112$_h$
AL121	Index error occurs when accessing CANopen PDO object.	8200-0121$_h$
AL122	Sub-index error occurs when accessing CANopen PDO object.	8200-0122$_h$
AL123	Data type (size) error occurs when accessing CANopen PDO object.	8200-0123$_h$
AL124	Data range error occurs when accessing CANopen PDO object.	8200-0124$_h$
AL125	CANopen PDO object is read-only and write-protected.	8200-0125$_h$
AL126	CANopen PDO object does not support PDO.	8200-0126$_h$

AL127	CANopen PDO object is write-protected when Servo On.	8200-0127$_h$
AL128	Error occurs when reading CANopen PDO object from EEPROM.	8200-0128$_h$
AL129	Error occurs when writing CANopen PDO object into EEPROM.	8200-0129$_h$
AL130	EEPROM invalid address range.	8200-0130$_h$
AL131	EEPROM checksum error.	8200-0131$_h$
AL132	EEPROM zone error.	8200-0132$_h$
AL201	CANopen load/save 1010/1011 error	6310-0201$_h$
AL301	CANopen SYNC failed (Servo On)	6200-0301$_h$
AL302	CANopen SYNC signal error (Servo On)	6200-0302$_h$
AL303	CANopen SYNC time out (Servo On)	6200-0303$_h$
AL304	CANopen IP command failed (Servo On)	6200-0304$_h$
AL305	SYNC period error (Servo On)	6200-0305$_h$
AL3E1	CANopen SYNC failed (Servo Off)	6200-03E1$_h$
AL3E2	CANopen SYNC signal error (Servo Off)	6200-03E2$_h$
AL3E3	CANopen SYNC time out (Servo Off)	6200-03E3$_h$
AL3E4	CANopen IP command failed (Servo Off)	6200-03E4$_h$
AL3E5	SYNC period error (Servo Off)	6200-03E5$_h$
AL401	CANopen state error	8100-0401$_h$

5.3 SDO Error Message Abort Codes

Abort Code	Description
05040001_h	Client/server command specifier not valid or unknown
06010002_h	Attempt to write a read only object
06020000_h	Object does not exist in the object dictionary
06040041_h	Object cannot be mapped to the PDO
06040042_h	The number and length of the objects to be mapped would exceed PDO length
06060000_h	Access failed due to an hardware error(store or restore error)
06070010_h	Data type does not match, length of service parameter does not match
06090011_h	Sub-index does not exist
06090030_h	Value range of parameter exceeded(only for write access)
08000000_h	General error
$080000a1_h$	Object error when reading from EEPROM
$080000a2_h$	Object error when writing to EEPROM
$080000a3_h$	Invalid Range when accessing EEPROM
$080000a4_h$	Checksum error when accessing EEPROM
$080000a5_h$	Password error when writing encryption zone
08000020_h	Data cannot be transferred or stored to the application (store or restore signature error)
08000021_h	Data cannot be transferred or stored to the application because of the local control(store or restore while wrong state)
08000022_h	Object is on the fly

6 Reference

1. CANopen Application Layer and Communication Profile, CiA Draft Standard 301, Version 4.02, Date: 13 February 2002
2. CANopen Device Profile Drives and Motion Control, CiA Draft Standard Proposal 402, Version 2.0, Date: 26 July 2002

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